AMENDMENT

Amendments to the Claims:

Please amend claim 1, without prejudice.

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (**Currently Amended**) A system for communications over the Internet, comprising:

at least one router connectable to a first user terminal;

at least one subscriber virtual frame relay switch (VS) connectable to the at least one router and configured to facilitate secure communication of frame relay messages from the first user terminal to a second user terminal over the Internet by encapsulating frame relay header and payload information of the frame relay messages within a payload transport protocol and encrypting and authenticating all packets of the payload transport protocol; and

at least one virtual router (VR) to connect the VS to the Internet via a firewall and a security **[[**model**]]** module for communications of the encapsulated frame relay messages between the first user terminal and the second user terminal over the Internet.

2. (**Original**) The system of claim 1, further comprising:

at least a second router connectable to the second user terminal;

at least a second VS connectable to the second router; and

at least a second VR to connect the second VS to the Internet for communications between the first user terminal and the second user terminal.

3. (**Previously Presented**) The system of claim 1, wherein the communications over the Internet is via an Internet Protocol Security (IPSec) tunnel.

4. (**Cancelled**)

5. (**Original**) The system of claim 1, further comprising a switch-to-switch signaling protocol to communicate signaling and other information between the at least one VS and a second VS.

6. (**Original**) The system of claim 1, further comprising a data link connection identifier (DLCI) to provide routing information to establish a communications link between the first user and the second user and to provide service parameters associated with the communications link.

7. (**Original**) The system of claim 6, wherein the DLCI service parameters comprise at least one of a frame size, a committed information rate (CIR), a committed burst rate (Bc), burst excess size (Be) and committed rate measurement error (Tc).

8. (**Original**) The system of claim 1, further comprising a local management interface (LMI) associated with the VS to respond to status inquiries and make status inquiries regarding other components of the system.

9. (**Original**) The system of claim 1, further comprising an operation support system to control establishment and operation of a communications link between the first user terminal and the second user terminal.

10. (**Original**) The system of claim 1, wherein the at least one VS implements signaling between other VSs in a virtual private network (VPN) for coordination of information transfer between VSs over the Internet and encapsulation of frame relay header and payload information for communication between users over the Internet.

11. (**Previously Presented**) The system of claim 1, wherein information is transferred between users in frames, each frame being encapsulated in a payload of an IP datagram and containing a sequence number to preserve the order of the frames.

12. (**Previously Presented**) A system for communications over the Internet, comprising:

a plurality of routers, each router connectable to at least one user terminal;

a plurality of Internet protocol service switches (IPSXs), each IPSX is connectable to at least one of the plurality of routers and comprises:

a subscriber virtual frame relay switch (VS); and

a virtual router (VR) to connect the VS to the Internet via a firewall and an Internet Protocol Security (IPSec) module for secure frame relay communications between the user terminals associated with each of the routers over the Internet.

13. (**Previously Presented**) The system of claim 12, wherein communications over the Internet among the plurality of IPSXs is via IPSec tunnels.

14. (**Original**) The system of claim 12, further comprising a payload transport protocol for communicating frame relay information between the VSs.

15. (**Original**) The system of claim 14, wherein the payload transport protocol organizes the payload information into at least one frame, the at least one frame comprising at least one of the following parameters:

a frame sequence number (Seq);

a discard enable bit (DE)

a forward explicit congestion notification (FECN);

a backward explicit congestion notification (BECN);

a data link connection identifier (DLCI); and

a frame relay over Internet protocol (FOIP) tunnel identification.

16. (**Previously Presented**) The system of claim 12, wherein the payload transport protocol is based on user datagram protocol (UDP/IP).

17. (**Previously Presented**) The system of claim 16, wherein the frame relay information is encapsulated in a frame relay over Internet protocol (FOIP) header that is then encapsulated in UDP.

18. (**Original**) The system of claim 12, further comprising a switch-to-switch signaling protocol (SSFOIP) to communicate signaling and other information between the different VSs and to provide periodic synchronization of the different VSs.

19. (**Previously Presented**) The system of claim 18, wherein the SSFOIP is based on UDP/IP and operates in parallel with the payload transport protocol.

20. (**Original**) The system of claim 12, further comprising a frame relay local management interface (LMI) associated with each VS to respond to and send component status inquiries.

21. (**Original**) The system of claim 12, further comprising an operations support system (OSS), the OSS establishing a permanent virtual circuit (PVC) between each of the user terminals in a virtual private network (VPN).

22. (**Original**) The system of claim 21, wherein the OSS installs the address information in each VS to communicate with all the other VSs in the VPN.

23. (**Original**) The system of claim 12, wherein each router has at least one data link connection identifier (DLCI) associated therewith comprising routing information to establish a communications link between the other routers in a

virtual private network (VPN) and to provide service parameters associated with the users level of frame relay service.

24. (**Original**) The system of claim 12, further comprising a services management system to permit IP service providers to deploy, manage and account for IP services.

25. (**Original**) The system of claim 12, further comprising a customer network management system to permit subscribers to monitor service status, generate reports and forecasts for network planning and service modification.

26-29. (**Cancelled**)

30. (**Previously Presented**) A method for communicating over the Internet, comprising:

receiving a frame relay message from a first subscriber terminal at a first Internet Protocol service switch (IPSX), the first IPSX including a subscriber virtual frame relay switch (VS) coupled to the first subscriber terminal, a virtual router (VR) to connect the VS to the Internet through a firewall and an Internet Protocol Security (IPSec) module;

the first IPSX encapsulating the frame relay message in a frame relay over IP (FOIP) header;

the first IPSX encapsulating the FOIP header and any payload information in user datagram protocol (UDP/IP); and

the first IPSX transmitting the UDP/IP encapsulated frame relay message over the Internet to a second subscriber terminal via an Internet Protocol Security (IPSec) tunnel between the first IPSX and a second IPSX.

31. (**Original**) The method of claim 30, further comprising stripping any overhead information in the frame relay message and encapsulating valid frames in the FOIP header.

32-33. (**Cancelled**)

34. (**Previously Presented**) A system comprising:

a plurality of user terminals;

a plurality of frame relay over Internet Protocol (FOIP) switches configured to securely transmit frame relay messages among the plurality of user terminals over a public IP network, each FOIP switch including a subscriber virtual frame relay switch (VS), a virtual router (VR), a firewall and a security module, the VS configured to interface with one user terminal of the plurality of user terminals and to provide access to the public IP network via the VR, the firewall and the security module;

a VPN associated with the plurality of FOIP switches formed and maintained by establishing Internet Protocol Security (IPSec) tunnels among the plurality of VRs and exchanging signaling information among the plurality of VSs using a switch-to-switch signaling protocol; and

wherein a frame relay message originated by a first user terminal of the plurality of user terminals and destined for a second user terminal of the plurality of user terminals is transmitted by a first FOIP switch of the plurality of FOIP switches by encapsulating a frame relay header and payload information of the frame relay message within a payload transport protocol, encrypting and authenticating all resulting packets and forwarding the encrypted resulting packets to a second FOIP switch via an IPSec tunnel between a first VR of the first FOIP switch and a second VR of the second FOIP switch.

35. (**Previously Presented**) A system for communications over the Internet, comprising:

a plurality of routers, each router connectable to at least one user terminal;

a plurality of frame relay over Internet Protocol (FOIP) switches, each FOIP switch is connectable to at least one of the plurality of routers and comprises:

a subscriber virtual frame relay switch (VS); and

a virtual router (VR) to connect the VS to the Internet via a firewall and an Internet Protocol Security (IPSec) module for secure frame relay communications between the user terminals associated with each of the routers over the Internet.

36. (**Previously Presented**) The system of claim 35, wherein communications over the Internet among the plurality of FOIP switches is via IPSec tunnels.

37. (**Previously Presented**) The system of claim 35, further comprising a payload transport protocol for communicating frame relay information between the VSs.

38. (**Previously Presented**) The system of claim 37, wherein the payload transport protocol organizes the payload information into at least one frame, the at least one frame comprising at least one of the following parameters:

a frame sequence number (Seq);
a discard enable bit (DE)
a forward explicit congestion notification (FECN);
a backward explicit congestion notification (BECN);
a data link connection identifier (DLCI); and
a FOIP tunnel identification.

39. (**Previously Presented**) The system of claim 35, wherein the payload transport protocol is based on user datagram protocol (UDP/IP).

40. (**Previously Presented**) The system of claim 39, wherein the frame relay information is encapsulated in a FOIP header that is then encapsulated in UDP.

41. (**Previously Presented**) The system of claim 35, further comprising a switch-to-switch signaling protocol (SSFOIP) to communicate signaling and other information between the different VSs and to provide periodic synchronization of the different VSs.

42. (**Previously Presented**) The system of claim 41, wherein the SSFOIP is based on UDP/IP and operates in parallel with the payload transport protocol.

43. (**Previously Presented**) The system of claim 35, further comprising a frame relay local management interface (LMI) associated with each VS to respond to and send component status inquiries.

44. (**Previously Presented**) The system of claim 35, further comprising an operations support system (OSS), the OSS establishing a permanent virtual circuit (PVC) between each of the user terminals in a virtual private network (VPN).

45. (**Previously Presented**) The system of claim 34, wherein the OSS installs the address information in each VS to communicate with all the other VSs in the VPN.

46. (**Previously Presented**) The system of claim 35, wherein each router has at least one data link connection identifier (DLCI) associated therewith comprising routing information to establish a communications link between the other routers in a virtual private network (VPN) and to provide service parameters associated with the users level of frame relay service.

47. (**Previously Presented**) A method for communicating over the Internet, comprising:

receiving a frame relay message from a first subscriber terminal at a first frame relay over Internet Protocol (FOIP) switch, the first FOIP switch including a subscriber virtual frame relay switch (VS) coupled to the first subscriber terminal, a virtual router (VR) to connect the VS to the Internet through a firewall and an Internet Protocol Security (IPSec) module;

the first FOIP switch encapsulating the frame relay message in a FOIP header;

the first FOIP switch encapsulating the FOIP header and any payload information in user datagram protocol (UDP/IP); and

the first FOIP switch transmitting the UDP/IP encapsulated frame relay message over the Internet to a second subscriber terminal via an Internet Protocol Security (IPSec) tunnel between the first FOIP switch and a second FOIP switch.